CLAIMS

1. A multibeam antenna comprising:

- a PBG material (20, 142, 172) (Photonic Bandgap) suitable for the spatial and frequency-wise filtering of electromagnetic waves, this PBG material exhibiting at least one stopband and forming an exterior surface (38; 158) radiating in emission and/or in reception,

- at least one defect (36, 76, 78, 156, 180) of periodicity of the PBG material in such a way as to create at least one narrow passband within said at least one stopband of this PBG material, and

- an excitation device (40 to 43, 84, 86, 160, 162, 190) suitable for emitting and/or receiving electromagnetic waves inside said at least one narrow passband created by said at least one defect,

characterized in that:

- the excitation device is suitable for working simultaneously at least around a first and a second distinct working frequency;

- the excitation device comprises a first and a second distinct and mutually independent excitation element (40 to 43, 84, 86), each suitable for emitting and/or receiving electromagnetic waves, the first excitation element being suitable for working at the first working frequency and the second excitation element being suitable for working at the second working frequency;

- the or each defect (36, 76, 78) of periodicity of the PBG material forms a leaky resonant cavity (36, 76, 78) exhibiting a constant height in a direction orthogonal to said exterior radiating surface (38), and determined lateral dimensions parallel to said exterior radiating surface;

- the first and the second working frequencies are suitable for exciting the same resonant mode of a leaky resonant cavity (36, 76, 78), this resonant mode being established in an identical manner regardless of the

lateral dimensions of the cavity, in such a way as to create on said exterior surface respectively a first and a second radiating spot (46 to 49), each of these radiating spots representing the origin of a beam of electromagnetic waves radiated in emission and/or in reception by the antenna,

- each of the radiating spots (46 to 49) exhibits a geometrical center whose position is dependent on the position of the excitation element which gives rise thereto and whose surface area is greater than that of the radiating element giving rise thereto, and

- the first and the second excitation elements (40 to 43, 84, 86) are placed one with respect to the other in such a way that the first and the second radiating spots (46 to 49) are disposed on the exterior surface (38) of the PBG material side by side and overlap partially.

2. The antenna as claimed in claim 1, characterized in that:

- each radiating spot (46 to 49) is substantially circular, the geometrical center corresponding to a maximum of power emitted and/or received and the periphery corresponding to a power emitted and/or received equal to a fraction of the maximum power emitted and/or received at its center, and

- the distance, in a plane parallel to the exterior surface, separating the geometrical centers of the two excitation elements (40 to 43, 84, 86), is strictly less than the radius of the radiating spot produced by the first excitation element plus the radius of the radiating spot produced by the second excitation element.

3. The antenna as claimed in claim 1 or 2, characterized in that the geometrical center of each radiating spot (46 to 49) is placed on the line orthogonal to said exterior radiating surface (38) and

passing through the geometrical center of the excitation element (40 to 43) giving rise thereto.

4. The antenna as claimed in any one of claims 1 to 3, characterized in that the first and the second excitation elements (40 to 43) are placed inside one and the same cavity (36).

5. The antenna as claimed in claim 4, characterized in that the first and the second working frequencies are situated inside the same narrow passband created by this same cavity (36).

6. The antenna as claimed in any one of claims 1 to 3, characterized in that the first and the second excitation elements (84, 86) are each placed inside distinct resonant cavities (76, 78), and in that the first and the second working frequencies are suitable for each exciting a resonant mode independent of the lateral dimensions of their respective cavity.

7. The antenna as claimed in claim 6, characterized in that it comprises a reflector plane (74) of electromagnetic radiation associated with the PBG material (72), this reflector plane being deformed in such a way as to form said distinct cavities.

8. The antenna as claimed in any one of claims 1 to 7, characterized in that the or each cavity is of parallelepipedal shape.